

इंटरनेट

मानक

### Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 6913 (1973): Stainless steel tubes for the food and beverage industry [MTD 19: Steel Tubes, Pipes and Fittings]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



BLANK PAGE



*Indian Standard*  
SPECIFICATION FOR  
STAINLESS STEEL TUBES FOR THE FOOD  
AND BEVERAGE INDUSTRY

( Second Reprint JUNE 1986 )

UDC 621.643.2 [669.14.018.8] : 663/664



© Copyright 1973

**INDIAN STANDARDS INSTITUTION**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

# Indian Standard

## SPECIFICATION FOR STAINLESS STEEL TUBES FOR THE FOOD AND BEVERAGE INDUSTRY

Steel Tubes, Pipes and Fittings Sectional Committee, SMDC 22

<i>Chairman</i>	<i>Representing</i>
SHRI J. G. KESWANI	Indian Tube Co Ltd, Calcutta
<i>Members</i>	
SHRI S. C. ANAND	Bharat Steel Tubes Ltd, New Delhi
SHRI K. C. SRIVASTAVA ( <i>Alternate</i> )	
SHRI E. ANANDA RAO	Tube Products of India, Madras
SHRI T. SIVASHANKAR ( <i>Alternate</i> )	
ASSISTANT DIRECTOR STANDARDS ( LOCO ), LUCKNOW	Ministry of Railways
SHRI D. K. ARORA	Jyoti Limited, Baroda
SHRI B. BEHERA	Hindustan Steel Ltd, Rourkela
SHRI C. DAS GUPTA ( <i>Alternate</i> )	
SHRI D. D. BHUPTANI	Indian Tube Co Ltd, Jamshedpur
SHRI B. B. CHAKRAVERTI	Superintendence Co of India Pvt Ltd, Calcutta
SHRI A. K. SHOME ( <i>Alternate</i> )	
DR R. K. DUBEY	National Metallurgical Laboratory (CSIR), Jamshedpur
EXECUTIVE ENGINEER, CENTRAL STORES DIVISION NO. 1	Central Public Works Department, New Delhi
SHRI C. P. GUPTA	Zenith Steel Pipes Ltd, Khopoli
SHRI K. S. RAMAKRISHNAN ( <i>Alternate</i> )	
SHRI T. N. JHA	Central Boilers Board, New Delhi
SHRI JACOB JOHN	Kalinga Tubes Ltd, Calcutta
SHRI AJIT MOHAPATRA ( <i>Alternate</i> )	
SHRI M. T. KANSE	Directorate General of Supplies & Disposals ( Inspection Wing ), New Delhi
SHRI S. C. KAPUR ( <i>Alternate</i> )	
SHRI B. KUMAR	Stewarts & Lloyds of India Ltd, Calcutta
SHRI A. N. CHAMPATY ( <i>Alternate</i> )	
SHRI S. MITTAL	Indian Oil Co Ltd, Bombay
SHRI R. K. AIRY ( <i>Alternate</i> )	
LT-CDR V. N. MADHAV RAO	Defence Metallurgical Research Laboratory, Hyderabad
SHRI P. S. ARAVINDAKSHAN ( <i>Alternate</i> )	
SHRI GOPAL J. PATEL	Gujarat Steel Tubes Ltd, Ahmedabad
SHRI SHAILESH V. SHAH ( <i>Alternate</i> )	

(Continued on page 2)

© Copyright 1973

INDIAN STANDARDS INSTITUTION

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

( Continued from page 1 )

*Members*

SHRI N. B. ROYCHOWDHURY  
SHRI S. L. ARANHA ( *Alternate* )  
SHRI J. L. SETHI

SHRI A. N. MEHANDALE ( *Alternate* )  
SHRI S. SRINIVASAN  
SHRI M. C. KESAVA RAO ( *Alternate* )  
SHRI R. K. SRIVASTAVA,  
Deputy Director ( *Struc & Met* )

*Representing*

Burmah-Shell Refineries Ltd, Bombay  
Public Works Department ( *Public Health Branch* ),  
Government of Haryana, Chandigarh  
Hindustan Shipyard Ltd, Visakhapatnam  
Director General, ISI ( *Ex-officio Member* )

*Secretary*

SHRI P. K. JAIN  
Assistant Director ( *Metals* ), ISI

# *Indian Standard*

## SPECIFICATION FOR STAINLESS STEEL TUBES FOR THE FOOD AND BEVERAGE INDUSTRY

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 16 March 1973, after the draft finalized by the Steel Tubes, Pipes and Fittings Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** This standard has been prepared to assist the users and manufacturers of stainless steel tubes for use in the food and beverage industry.

**0.3** In the preparation of this standard assistance has been derived from ISO/R 1127-1969 'Stainless steel tubes — Dimensions, tolerances and conventional mass s per unit length' and ISO/R 2037-1971 'Pipes and fittings — Stainless steel tubes for the food industry', issued by the International Organization for Standardization.

**0.4** For stainless steel milk pipes and fittings reference may be made to IS : 3382-1965\*.

**0.5** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

---

### 1. SCOPE

**1.1** This standard covers the requirements for welded and seamless stainless steel tubes for the food and beverage industry.

### 2. SUPPLY OF MATERIAL

**2.1** General requirements relating to the supply of material shall be as laid down in IS : 1387-1967‡.

\*Specification for stainless steel milk pipes and fittings.

†Rules for rounding off numerical values (*revised*).

‡General requirements for the supply of metallurgical materials (*first revision*).

**3. MANUFACTURE**

**3.1** The steel shall be made by the electric-furnace process or other process approved by the purchaser.

**3.2** The tubes shall be made by seamless or welded process.

**3.2.1** Tubes may be furnished either hot finished or cold finished.

**4. HEAT TREATMENT**

**4.1** All tubes shall be supplied in the heat-treated condition. The heat treatment shall consist in heating the pipe uniformly to 950 to 1 100°C and then cooling rapidly in air, water or oil.

**5. CHEMICAL COMPOSITION**

**5.1** The ladle analysis of steel shall conform to one of the grades specified in Table 1.

NOTE — An Indian Standard for the methods of chemical analysis of stainless steel under preparation. Till it is published, the method of analysis shall be as agreed between the purchaser and the manufacturer.

**TABLE 1 CHEMICAL COMPOSITION**

GRADE	CONSTITUENT, PERCENT							
	C <i>Max</i>	Si <i>Max</i>	Mn <i>Max</i>	S <i>Max</i>	P <i>Max</i>	Ni	Cr	Mo
A	0.030	1.0	2.0	0.030	0.045	9.0-13.0	17.0-20.0	—
B	0.08	1.0	2.0	0.030	0.045	9.0-13.0	17.0-20.0	—
C	0.03	1.0	2.0	0.030	0.045	10.5-14.0	16.0-18.5	2.0-3.0
D	0.08	1.0	2.0	0.030	0.045	10.5-14.0	16.0-18.5	2.0-3.0

**5.2** When requested by the purchaser, analysis of one billet per heat or two lengths of flat-rolled stock per heat or two tubes from each heat shall be made. The chemical composition thus determined shall conform to the requirements.

**5.3** If the analysis of one of these test specimens does not conform to the requirements specified, an analysis of two billets or two lengths of flat-rolled stock or two tubes from the same heat may be made, each of which shall conform to the requirements specified.

**6. DIMENSIONS**

**6.1** The outside diameters of tubes and thicknesses shall be as given in Table 2.



TABLE 2 DIMENSIONS

( Clause 6.1 )

All dimensions in millimetres.

OUTSIDE DIAMETER	THICKNESS	
	Welded Tubes	Seamless Tubes
12·7	1·2, 1·6	—
15·9	1·6, 2·0	—
19·0	1·6, 2·0	—
25·4	1·6, 2·0, 2·3	3·2, 3·6
31·8	2·0, 2·3	3·2, 3·6
38·0	2·0, 2·3	3·2, 3·6
44·5	2·0, 2·3	3·2, 3·6
51·0	2·0, 2·3	3·2, 3·6
57·0	2·3, 2·6	3·6, 4·0
63·5	2·3, 2·6	3·6, 4·0
70·0	2·3, 2·6	3·6, 4·0
76·2	2·3, 2·6	3·6, 4·0
88·9	2·6, 2·9	3·6, 4·0
101·6	2·6, 2·9	3·6, 4·0
114·3	2·6, 2·9	4·0, 4·5
133·0	2·9, 3·2	4·0, 4·5
139·7	2·9, 3·2	4·0, 4·5
168·3	2·9, 3·2	4·0, 4·5
193·7	2·9, 3·2	4·0, 4·5
219·1	2·9, 3·2	4·0, 4·5

## 7. TOLERANCES

**7.1 Outside Diameter** — Two sets of tolerances on the outside diameter have been specified as follows. Depending on his requirements the purchaser should specify one of the two sets in his order:

- a)  $\pm 0\cdot50$  percent with a minimum  $\pm 0\cdot10$  mm, and
- b)  $\pm 0\cdot75$  percent with a minimum of  $\pm 0\cdot30$  mm.

**7.2 Wall Thickness** — The tolerance on the wall thickness for seamless tubes shall be  $\pm 12\cdot5$  percent and for welded tubes shall be  $\pm 10$  percent.

## 8. FINISH

**8.1 Finished tubes** shall be reasonably straight and have smooth ends free from burrs. They shall be free from injurious defects and shall have a workmanlike finish.

**8.2** For tubes polished on the inside surface only, the outside surface may have minor defects removed by grinding, provided the wall thicknesses are not decreased to less than that specified in 7.2.

**8.3 Surface Finishes** — The surface finish shall be measured in accordance with IS : 3073-1967\*. For critical surfaces ( in contact with food or beverage )  $R_a$  shall be  $\leq 1.0 \mu\text{m}$ . For other surfaces  $R_a$  shall be  $\leq 2.5 \mu\text{m}$ .

NOTE — The roughness of the welded bead should not exceed  $16 \mu\text{m}$ .

## 9. CORROSION RESISTANCE

**9.1** If required by the purchaser, the pipes shall be tested for corrosion resistance. The method of test and specification requirements shall be agreed to between the purchaser and the manufacturer.

## 10. TENSILE TEST

**10.1** Two percent of tubes from each batch, with a minimum of two tubes shall be tested in accordance with IS : 1894-1972† and the material shall conform to the following requirements.

Grade	Tensile Strength N/mm <sup>2</sup>	Elongation on $5.65\sqrt{S_0}$ , Min percent
A, B and C	490-605	30
D	510-705	30

## 11. HYGIENIC CONDITIONS

**11.1** Proper care should be taken to see that non-ferrous metals and alloys that are joined with stainless steel tubes during fabrication do not leave any harmful deposits affecting either the assembly or the food or beverage being manufactured.

## 12. MARKING

**12.1** Each pipe shall be marked with the following details:

- a) Grade,
- b) Outside diameter,
- c) Thickness, and
- d) Length of the tube ( it is not usual to mark the length and supply can be in random lengths ).

\*Assessment of surface roughness.

†Method for tensile testing of steel tubes (first revision).

**12.1.1 The pipes may also be marked with the ISI Certification Mark.**

**NOTE** — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.